

felt, and, besides, his mathematical tastes would naturally incline him, of the two, to take up electricity rather than geology.

It is lamentable to think that this radical change, by which science is virtually shelved, is solely due, as the Duke of Cambridge said, to a desire on the part of the authorities to eliminate the "crammers," and get boys passed into Sandhurst and Woolwich direct from the public schools.

Now, however desirable the approximation to such an ideal may be to the authorities, or even the public schools, it is very questionable whether it will prove equally desirable for the service, unless indeed means are taken to insure that the schools will do their work more efficiently than heretofore. This is scarcely likely to be accomplished by cutting science or even English literature out of the scheme, under the pretence that such subjects admit of being "crammed." The truth is that in these points the authorities have simply pandered to the present inability of the schools to teach these subjects successfully. Nor is it likely that the schools will be any more successful in the teaching of French and German up to the new standard, than they have been up to the old. In this, as in everything else, the tutors by the new scheme are really left masters of the situation.

Why do not the authorities accept what the Marquess of Salisbury maintained was inevitable so long as competitive examinations existed, and instead of attempting the impossible task of uprooting the tutor, place him on a recognised official footing, give him in place of the prestige which efficiently insures the maintenance of discipline at the large public schools, the protecting ægis of a few simple rules which every tutor would be obliged to enforce, and the breach of which would render the offender liable to be denied entrance into the service? This would correct the evils which are prevalent at some of our larger army "coaching" establishments, and then there need be no reason for the pretence under which a candidate is supposed to be better fitted for life by a total ignorance of science and the literature of his own country, in lieu of which, like a parrot, he has been taught to chatter one or two foreign languages.

Tunbridge Wells, July 1 E. DOUGLAS ARCHIBALD

Animal Intelligence

HAVING noticed some time ago a number of letters in NATURE on the above subject, I venture to publish an instance, which came under my own observation last month, of extraordinary intelligence in a rat. I was standing in the doorway of a large shed, the further end of which had been partitioned off with bars to form a fowl-house, when I was attracted by a gnawing and scraping noise; turning round I saw a rat run from a large dog-biscuit which was lying on the floor, and pass through the bars. Being curious to watch if he would return, I kept quiet, and presently saw a well-grown specimen of the "common brown rat" (*Mus decumanus*) come cautiously forward, and after nibbling for a short time at the biscuit, drag it toward the bars, which are only two inches apart, and would not allow the biscuit to pass. After several unsuccessful attempts he left it, and in about five minutes returned with another rat, rather smaller than himself. He then came through the bars, and, pushing his nose under the biscuit, gradually tipped it on edge, rat number two pulling vigorously from the other side; by this means they finally succeeded in getting a four-inch biscuit through a two-inch aperture. Not feeling pleased that my dog's biscuits should be used as food for rats, I threw a hammer at them and picked up the biscuit.

I think the conduct of these animals showed a wonderful amount of intelligence; it was evident that the first rat saw that to get the biscuit through the bars it was necessary that it should be on its edge, and, not being able to tip it and pull at the same time, he gained the assistance of a friend.

The short space of time during which he was absent, and the concerted action, show also that they must have some wonderfully facile means of communicating ideas. T. W. KIRK

Colonial Museum, Wellington, New Zealand, May

ABOUT twenty miles from this, in the town of Larne, there resides a gentleman in the possession of a cat, which is so great a favourite that every day a plate and chair are placed for her beside her master, whose repast she shares with supreme content.

One day for some reason the dinner was postponed, but the cat came in at the usual hour. She was evidently much discon-

certed at seeing nothing going on, walked once or twice disconsolately round the table, then disappeared. Shortly afterwards she returned with a mouse, which she laid on her master's plate, then going away, she came back a second time with a mouse, which she put on her own plate. She postponed further proceedings until her master returned, when she immediately began to purr and rub herself against his legs, as much as to say, "See how nicely I have provided for you."

Between this town and the village of Hollywood there is a country house which happened to take fire last week. The cat of the house, which had access to the servant-maid's apartments, ran up and pawed the young woman's face. Being very drowsy, the girl turned to sleep afresh. The cat, however, after some interval returned, and proceeded to scratch the girl's face to such purpose that she rose, and, smelling the fire, wakened the other members of the household, and the flames were extinguished.

A nephew of mine who is fond of cats generally keeps three or four, and by dint of pains and kindness teaches them a variety of tricks. I saw one of them sipping cream from a teaspoon, which it held between its two forepaws. I might relate quite a number of other particulars about cats, but do not like to trespass further on your space. The foregoing, along with the other details which I have already furnished, are perhaps not unworthy to be placed beside the interesting particulars narrated by the younger Cuvier and Mr. Romanes in reference to the intelligence of animals.

HENRY MACCORMAC

Belfast

Butterflies as Botanists

THE caterpillars of *Mechanitis*, *Dircenna*, *Ceratinia*, and *Ithonia* feed on different species of *Solanaceæ* (*Solanum*, *Cyphomandra*, *Bassovia*, *Cestrum*), those of the allied genus *Thyridia* on *Brunfelsia*. Now this latter genus of plants had been placed unanimously among the *Scrophularinæ*, till quite recently it was transferred by *Bentham* and *Hooker* to the *Solanaceæ*. Thus it appears that butterflies had recognised the true affinity of *Brunfelsia* long before botanists did so.

There is yet another and more curious instance of our butterflies confirming the arrangement of plants in *Bentham* and *Hooker's* "Genera Plantarum." *Ageronia* and *Didonis* were formerly widely separated by lepidopterists, being even considered as constituting distinct families, but now they are to be found beside one another among the *Nymphalinae*, and the structure of their caterpillars leaves no doubt about their close affinity. The caterpillars of *Ageronia* feed on *Dalechampia*, those of *Didonis* on *Tragia*. Now these two *Euphorbiaceæ* genera were widely separated by *Endlicher*, who placed the former among the *Euphorbiæ*, the latter among the *Acalyphæ*; *Bentham* and *Hooker*, on the contrary, place them close together in the same sub-tribe of *Plukenetieæ*, and thus their close affinity, which had been duly appreciated by butterflies, has finally been recognised by botanists also. FRITZ MÜLLER

Blumenau, Santa Catharina, Brazil, June 1

Christian Conrad Sprengel

WILL you allow me a short reply to Prof. Hagen's letter published in NATURE (vol. xxix. p. 572)? It is evident that Prof. Hagen's statements are very far from proving what he asserted in his former letter, viz. that between 1830 and 1840 Sprengel's discoveries were known to every student in Prussia, and I think it would be easy to any one resident in Germany to prove the contrary by simply confronting what the manuals of botany published at that time say about the fertilisation of flowers. Thus, as I learn from *Delpino's* "Ulteriori Osservazioni" (p. 88), *Link* ("Elem. Philos. Bot.," ii. 1837, p. 222) and *Treviranus* ("Physiol. der Gew.," ii. 1838, p. 343), both of whom, according to Hagen, were entirely acquainted with Sprengel's discoveries, adopt *Cassini's* erroneous view of the fertilisation of *Campanula* being effected through the collecting-hairs of the style instead of through the stigmatic papillæ; and this must have been almost impossible for any one acquainted with Sprengel's excellent account of *Campanula rotundifolia* ("Entdeckte Geheimniss," p. 109). What Prof. Kunth, in his lectures at the Berlin University, taught about the fertilisation of flowers may be seen in his "Lehrbuch der Botanik" (1847, p. 422). Almost every line contains errors splendidly and convincingly refuted by Sprengel. Thus he considers as contrivances serving

to aid the self-fertilisation of the flowers the collecting-hairs on the style of Campanulaceæ and Compositæ (see Sprengel, pp. 109 and 370), the pollen-masses of Orchideæ and Asclepiadeæ being fixed near the stigma (Sprengel, pp. 401 and 139), the movements of the stamens of Parnassia, Ruta, and Saxifraga (Sprengel, pp. 166, 236, and 242), as well as the movements of the stigmas of Nigella, Passiflora, and Epilobium (Sprengel, p. 280, 160, and 224). I do not know how to reconcile these errors with Prof. Hagen's statement that Kunth was "beyond doubt acquainted with the facts" discovered by Sprengel. He "beyond doubt" never read Sprengel's book, and I can explain those numerous and crass errors of one of the most celebrated botanists only by the assumption that at that time Sprengel had fallen into almost complete oblivion among German botanists, and remained so till, as Prof. Möbius justly remarks (NATURE, vol. xxix. p. 406), "the value of his treatise in its bearing on the theory of selection was first recognised by Charles Darwin."

FRITZ MÜLLER

Blumenau, Santa Catharina, Brazil, May 25

Voracity of the Drosera

I AM not aware that the *Drosera* has been noticed to capture so large an insect as the dragon-fly, *Pyrrosoma minimum*. Passing a pond-side on a bright June morning, where this insect was flying plentifully, and near which *Drosera rotundifolia* was growing in abundance, I saw that many of these insects had fallen victims to the carnivorous propensities of the plant. On one spot about a foot square I counted six plants which had captured specimens of the dragon-fly, besides smaller insects. One plant had possessed itself of two of the dragon-flies, one being partially digested and the other freshly caught. The *Drosera* plants, being young, were in many instances less in expanse than the dragon-flies caught upon them, which measure about two inches across the wings, with a body about one inch and a half long. The dragon-flies appeared to be attracted to the plants by the reflected sunlight glistening upon the beads of fluid secreted from the leaves, and from which the plant receives its common name of "sun-dew." Those dragon-flies which I saw caught hovered over the plants about a second, at a distance of three or four feet, and then darted upon the plant, when they were instantly caught.

A. BALDING

Wisbech, July 3

Lightning

AT this time of the year one commonly reads of persons being struck dead, blind, or senseless by lightning; some of the phenomena are very puzzling, especially in cases where persons are but slightly injured.

On June 6, 1881, I was in the open country near the sea between Gosport and Southampton, in a place where there was no shelter. Here I was suddenly overtaken by a violent storm of thunder, lightning, and rain. Before I had time to think of escape, the air became darkened by the pouring rain, and, to save myself from a drenching, I perhaps foolishly put up my umbrella; at the same instant I saw a blaze of fire on the right-hand side of my face; the thunder burst at the same moment, and a violent wrenching pain seized the fingers of my right hand (which held the umbrella), the pain instantly travelling to my elbow and shoulder, where it ceased. With the exception of a strong pain in the arm like rheumatism for the rest of the day, I felt no further ill effects.

There is a blind beggar sometimes seen about here who carries a label stating that his eyes were destroyed by lightning; there is no iris to either eye; both are quite white. One day lately I asked him how he lost his sight. He said that he was leaving a country public-house during a thunder-storm, and he received the blow from the lightning at the street-door, as he stood on the top of a short flight of stone steps. He could only remember seeing the blaze of the lightning, and being hurled to the ground down the steps into the street. On his senses returning, he was blind. He states that he had a little glimmering sight at the time of recovery, but first one eye and then the other soon became totally blind.

A few years ago several letters appeared in NATURE regarding the descent of balls of fire in thunder-storms. On July 5, 1881, whilst watching a storm from my windows at 11.30 p.m. I distinctly saw in the south a ball of fire drop from the clouds to the earth. The descent was rapid, but not comparable with

lightning, and with an inclination to the east. The ball appeared large, and about one-half or one-third the apparent size of the moon. A carpenter who was working for me at the time, Mr. George Hebb, on calling upon me a few days after the storm, told me (I had not previously mentioned the matter to him) that he had seen the descent of the same ball of fire from Mildmay Park whilst he was walking towards the south. It is the only example I have seen.

WORTHINGTON G. SMITH

Solar Halo

ON Friday, June 27, about 5 p.m. my attention was drawn to a solar halo which lasted for about two hours from that time; the circular part of the halo was white, and about the size of an ice halo, the sun apparently about four times its proper size and of badly-defined outline; all within the halo was darker than the rest of the sky, and vertically over the sun there was about an octant of another circle (?) touching the first one, but prismatically though not brilliantly coloured. On Saturday night there was a strong pink glow from 9 to 9.30 in the north-north-west, with a greener sky near the moon, which was itself also somewhat green.

W. W. TAYLOR

INSECT PESTS IN THE UNITED STATES¹

THIS volume is issued under the auspices of the Department of Agriculture, and relates entirely to five insect pests. The book is full of matter of general as well as of purely scientific interest, and abounds in suggestions for checking and exterminating the pests of which it treats.

One rises from its perusal with a sense of thankfulness for our temperate climate, insularity, and moderate dimensions. These conditions are unfavourable to excessive multiplication of insect life; and hence we escape the locust, the canker-worm, and the palmer-worm, in their full devastating energy. The connection between solar activity and swarms of insects forms a special section; and the relation between sunspots and locust flights is drawn out in tabular form, showing a striking coincidence between special locust visitations and the minimum of sunspots. This is of course merely a scientific way of showing that hot summers breed insects. The Report deals with the Rocky Mountain Locust, the Western Cricket, the Army-Worm, Canker-Worm, and Hessian Fly, and the treatment of the subject is a full justification of the existence of such a Commission.

An Entomological Section of an Agricultural Department appears to be an absolute necessity in those vast regions, and the facts and phenomena are so startling as to be worthy of constant watchfulness, and this can only be secured by a special and permanent Commission. On the other hand, the powerlessness of man in dealing with the actual invading forces of the winged or creeping armies of Hexapoda is constantly exemplified. It is truly observed that the only effective method of dealing with insects is to study their habits, their structure, their weaknesses, their devolution. It is here that the entomologist shakes hands with the agriculturist. The cultivator is paralysed by the magnitude of the devastation, and the best he can do is to take such self-evident means as are at once available, such as burning, rolling, roping, or the like. The entomologist works less precipitately, but more surely, in studying the sexual and maternal habits of the *imago*, the conditions favourable to incubation, the hatching and development of the *larva*, the transformations to the *pupal* and perfect forms, and lastly, the food and habits of the mature insect.

All these and other matters are searched into by the State entomologist much upon the same principle as a Government section collects information as to the habits and resources of some nation with which it may at some time find itself at war. Thus the Entomological Commission

¹ "Third Report of the United States Entomological Commission. (Washington Government Printing Office, 1883.)